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(54) Oil feeding collet chuck and its collet

Spannzangefutter mit Ölförderung und seiner Spannzange

Mandrin à pince à circulation d'huile et sa pince

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EP 0 618 030 B1

Description

This invention relates to a collet chuck and a collet used in it and more particularly to an oil feeding collet chuck wherein cutting oil is supplied to a tool fitted in a collet chuck from an oil passage in a main body of the chuck and to a collet for the chuck.

EP-A- 0 263 982 discloses a collet chuck having a collet which comprises a first and a second set of axially long radial slits, the first slits opening at the front end surface of the collet and the second slits opening at the back side of the collet. All slits of both sets are intersecting the clamping groove. There is no mentioning of an oil feeding to the collet chuck.

DE 41 15 992 A1 discloses a collet chuck wherein internal oil feeding channels are provided. No axially long slits opening at the end surface are provided.

Fig. 7 shows a further embodiment of a conventional collet chuck.

A main body 1c of the conventional collet chuck Ac comprises a tapered hole 2c, at one end thereof, to put a collet 9c therein and an inside oil passage 4c communicating with the tapered hole 2c, as shown in Fig. 7. The outside surface of the collet 9c is made in a tapered form to fit closely in the tapered hole 2c. The collet 9c includes a groove 17c at the front end portion (the large radius side) of the outside surface thereof, a fitting flange 18c contiguous to the groove 17c and a tool holding hole 13c formed in the axial portion thereof. A plurality of axially long radial slits 14c are formed in the collet 9c at circumferential suitable intervals and terminate in an annular base portion 12c at the rear end portion (the small radius side) of the collet 9c and a loose hole 34 is formed in this base portion 12c. All the radial slits 14c are open at the front end of the collet 9c and communicate with the loose hole 34 and the tool holding hole 13c. The axially long radial slits 14c allow for the radial constriction of the collet 9c. The collet chuck Ac is provided with a clamp member 20c to press the collet 9c into the tapered hole 2c. Cutting oil is supplied to a tool 28c fitted in the tool holding hole 13c from the oil passage 4c through the loose hole 34 and the radial slits 14c.

When the cutting oil is supplied at a constant flow rate, the axial speed of the cutting oil flowing out of the front end of the collet 9c is inversely proportional to the sum of those cross-sectional areas of all the radial slits 14c which are perpendicular to the axis of the collet 9c at the front end of it. This sum is considerably large for the radial slits 14c provided for the purpose of constricting the collet radially. Accordingly, the axial speed of the cutting oil is rather small and the cutting oil can not be sufficiently supplied to a tip 29c of the tool 28c where the cutting oil is most required. When the chuck Ac is rotated at a high speed, the cutting oil subject to the centrifugal force due to rotation will flow radially out of the front end of the collet 9c as well and the supply of the cutting oil to the tool 28c is the more insufficient. Furthermore, the cutting oil together with scrap and dust metals contained in it enters the grooves for balls 25c formed in a main body 21c of a clamp member 20c and the main body 21c sometimes becomes unable to rotate.

In another conventional collet chuck Ad shown in Fig. 8, an oil duct 32d is formed, along the axis of a tool 28d, from a tip 29d of the tool 28d to the rear end of it. In all the figures of the present specification, same reference numerals represent same or equivalent members and accompanying alphabets a through d are used in order to discriminate different examples and embodiments. The oil duct 32d communicates directly with an oil passage 4d at the rear end of the tool 28d and a gum seal 35 prevents the cutting oil from leaking towards radial slits 14d. In this collet chuck, the cutting oil is supplied sufficiently to the tip 29d of the tool 28d through the oil duct 32d.

However, when the chuck is used for a long time and the gum seal is damaged, the cutting oil begins to leak to the radial slits and the cutting oil again is not supplied sufficiently.

An object of the present invention is to provide an oil feeding collet chuck wherein axially long radial slits are formed in a collet in order to constrict the collet radially but cutting oil does not flow directly outwards from the radial slits but flows out from different jets having a suitable cross-sectional area with a sufficient axial speed, and to provide the collet for the chuck.

According to the present invention, an oil feeding collet chuck is provided as defined in claim 1. Narrow jets are formed in the front end base portion and are opening at the end surface of the base portion and communicate with an oil passage through the radial slits of the second set or a passage provided additionally. Cutting oil supplied to the collet from the oil passage blows out towards a tip of a tool only through the jets.

Further, the present invention provides an oil feeding collet chuck wherein axially long radial slits are formed in a collet in order to constrict the collet radially but cutting oil does not flow to the radial slits but flows out of a tip of a tool through the axial portion of the tool, and provides the collet for the chuck.

In accordance with the invention, an oil feeding collet is provided as defined in claim 7.

In this case, the collet is formed with the above mentioned first and second sets of axially long radial slits and the tool is formed with an axial oil duct, the rear end of which communicates directly with the oil passage. The cutting oil flows out of the front end of this oil duct towards the tip of the tool. Even when the cutting oil leaks from a junction between the oil passage and the oil duct, it is prevented by a zigzag path from flowing out to the outside of the collet, and the cutting oil again flows out only from the oil duct after the cutting oil fills completely the second set of slits.

Other objects and advantages of the invention will become apparent in the following discussions in reference with accompanying drawings.

Fig. 1 is a longitudinal section of a collet chuck taken along a line I-I in Fig. 3A for a collet;

Fig. 2 is a longitudinal section of the collet chuck taken along a line II-II in Fig. 3B for the collet;

Figs. 3A, 3B, 3C and 3D are a front end side elevation, a front elevation and a rear end side elevation of the collet and a section taken along a line D-D in Fig. 1, respectively;

Figs. 4A, 4B and 4C are views in partial section showing the assembling procedure of the collet;

Fig. 5 is a front elevation of a different collet;

Fig. 6 is a longitudinal section of the different collet taken along a plane including a first set of radial slits;

Fig. 7 is a longitudinal section of a conventional collet chuck and

Fig. 8 is a longitudinal section of a different conventional collet chuck.

In reference with Figs. 1 through 4C, a base portion 1g of an oil feeding collet chuck A is adapted to be mounted on a well known tool holder or a rotation axis of a machine tool or the like. A main body 1 of the collet chuck A is made in a cylindrical form. A tapered hole 2 is formed in the front end portion 1h and a male screw portion 3 is provided on the outside surface of the end portion 1h. An oil passage 4 is formed as a hollow portion in the main body 1. A female screw 5 is formed on the inside surface of the main body 1 and a positioning member 6 to adjust the protruding length of a tool 28 is in mesh with the female screw 5. An axial hole 7 for the circulation of cutting oil is formed in the positioning member 6 and communicates with an outlet 8 for the cutting oil.

In the next place, a collet 9 able to feed the cutting oil comprises a main portion 10, an annular front end base portion 11 and an annular rear end base portion 12 and the outside surface of the collet 9 is made in a tapered form closely adaptable in the tapered hole 2. A tool holding hole 13 is formed in the axial portion of the collet 9. A first set of axially long radial slits 14 and a second set of axially long radial slits 15 are formed in the collet 9 for the purpose of making possible the radial constriction of the collet 9. The radial slits 14 of the first set are opening at the end surface 11g of the front end base portion 11 and terminate to be closing in the rear end base portion 12 and the radial slits 15 of the second set are opening at the end surface 12g of the rear end base portion 12 and terminate to be closing in the front end base portion 11. The radial slits 14 of the first set and the radial slits 15 of the second set are arranged at suitable angular intervals and alternatively along the peripheral direction of the collet 9. As is seen in Fig. 3B, a part of the outside surface of the base portion 11, that outside surface of the main portion 10 which is not formed with the slits 14 and 15 and a part of the outside surface of the base portion 12 form a zigzag path 16 closed over the whole periphery of the collet 9. The outside surface of the collet 9 contacts closely the inside surface of the tapered hole 2 along the zigzag path 16. The outside surface of the tool 28 contacts closely with the inside surface of the collet 9, i.e., the inside surface of the tool holding hole 13 along a similar zigzag path. In order to establish the substantial contact at the inside and outside surfaces of the collet 9, the zigzag path 16 in the present embodiment is adapted to span over an axial length L shown in the figure. A groove 17 and a fitting flange 18 contiguous to it are formed on the outside surface of the base portion 11. These groove 17 and fitting flange 18 form an engage portion to be described later. One or more of thin jets 19 communicate with the radial slits 15 through a passage 19g formed in the base portion 11. The jets 19 may communicate with the oil passage 4 through a path provided independently on the slits 15. The crosssectional area of the jet 19 is made so small that the cutting oil can reach a tip 29 of the tool 28 with a sufficient axial speed in spite of the centrifugal force due to high speed rotation of the chuck A.

In the next place, a well known cylindrical clamp member 20 to press the collet 9 into the tapered hole 2 comprises a cylindrical main body 21 and an engage member 22 connected to it. The main body 21 is formed, on the inside surface thereof, with a female screw portion 23 adapted to be in mesh with the male screw portion 3. The engage member 22 is formed, on the inside surface thereof, with a fitting groove 24 adapted to engage the fitting flange 18 and is connected, at the outside surface thereof, to the main body 21 by a ball 25 so that the main body 21 may rotate relative to the engage member 22 but move axially together with it.

The collet chuck A as constructed above is assembled in the following well known procedure. As shown in Fig. 4A, the collet 9 is inserted into a hollow portion 36g in the clamp member 20 located off the axis 9g of the collet 9 from the front end base portion 11 of the collet 9 along the axis 9g of the collet 9 not coaxial with the axis 20g of the clamp member 20. As shown in Fig. 4B, when the collet 9 is inserted in the clamp member 20 without being obstructed by a projection 36 contiguous to the fitting groove 24, owing to an eccentric distance D', a part of an annular conical outside surface 27 in the front end base portion 11 of the collet 9 abuts on a part of a conical inside surface 26 of the engage member 22 coaxial with the axis 20g. When the collet 9 is inserted further into the clamp member 20, the conical side surfaces 26 and 27 contact each other completely, the collet 9 becomes automatically coaxial with the clamp member 20, the projection 36 fits in the groove 17 and the fitting flange 18 fits in the fitting groove 24 as shown in Fig. 4C. The collet 9 and the clamp member 20 are united at their coaxial position in this manner. Next the positioning member 6 is secured at a predetermined position in the oil passage 4 in the chuck A. The tool 28 is inserted in the tool holding hole 13 of the collet 9 united with the clamp member 20 and the rear end of the tool 28 is caused to abut on the positioning member

6. Then the cylindrical main body 21 of the clamp member 20 is rotated and the collet 9 is pressed into the tapered hole 2. As the collet 9 with the tapered outside surface is pressed in the tapered hole 2, a radial force acts on the collet 9 and it contracts radially owing to the presence of the axially long radial slits 14 and 15. As a result, the inside surface of the collet 9 binds the tool 28 tight and allows the tool 28 to rotate together with the chuck A in spite of a reaction force exerted by a work piece on the tool 28.

The main body 1 of the chuck A assembled in the above mentioned manner is rotated and the tip 29 of the tool 28 rotating with the chuck A performs a well known machining process such as boring. In this case, the cutting oil supplied at a constant flow rate reaches the jets 19 through the oil passage 4, the axial hole 7, the outlet 8 and the radial slits 15 and flows out of the jets 19 forcibly with a sufficient axial speed to the tip 29 and the work piece. This cutting oil cools the tip 29 effectively and simultaneously gives satisfactory lubrication between the tip 29 and the work piece. Since the outside and inside surfaces of the collet 9 contact closely with the inside surface of the tapered hole 2 and the outside surface of the tool 28, respectively along the aforementioned respective zigzag paths 16, the cutting oil does not leak along the outside and inside surfaces of the collet 9 but flows out of the jets 19 alone. Accordingly, the axial speed of the cutting oil of the constant flow rate is determined only by the crosssectional area of the jet 19 and can be adjusted to a desired value.

In the next place, a different embodiment of the collet is explained in reference with Fig. 5. In this embodiment, a first slit group including a single radial slit 14a and a second slit group including two radial slits 15a are arranged alternatively and a zigzag path 16a is formed similarly as in the previous embodiment. The number of the slits 14a and 15a included in these slit groups is arbitrary so long as a collet 9a can be subjected to appropriate radial constriction.

In the next place, an embodiment including a different tool 28b is explained in reference with Fig. 6. In the front end of a positioning member 6b is formed a depression 31 to receive a connecting projection 30 formed as the rear end of the tool 28b and communicates with an axial hole 7b formed in the front end of the positioning member 6b. An oil duct 32 is formed along the whole length of the axis of the tool 28b and has a plurality of open ends 19b branching off at a tip 29b.

This chuck Ab is assembled in the same manner as the chuck Aa in the previous embodiment and an axial hole 7b communicates with the oil duct 32. A main body 1b of the chuck Ab is rotated and the cutting oil supplied at a constant flow rate flows out of the branching jets 19b forcibly with a sufficient axial speed through an oil passage 4b, the axial hole 7b and the oil duct 32. Also in this case, the outside and inside surfaces of a collet 9b contact closely with the inside surface of a tapered hole 2b and the outside surface of the tool 28b, respectively along zigzag paths similar to those aforementioned. Accordingly, even if the cutting oil leaks through the junction between the axial hole 7b and the oil duct 32, this oil just fills a space 33 between the main body 1b and the tool 28b and the slits 15b of the second set (not shown) but does not flows out of the chuck Ab along the inside and outside surfaces of the collet 9b.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that the invention is not limited to the specific embodiments thereof except as defined in the appended claims

Claims

1. An oil feeding collet chuck (A) comprising a main body (1) including a tapered hole (2) formed in the front end portion (1h) thereof and an oil passage (4) communicating with said tapered hole (2), a collet (9) including a tapered outside surface closely adaptable in said tapered hole (2), a tool holding hole (13) formed in the axial portion thereof and an engage portion (17, 18), a clamp member (20) to press said collet (9) into said tapered hole, said engage portion (17, 18) being adapted to be connected to said clamp member (20), a tool (28) fitted in said tool holding hole (13) and jets (19) communicating with said oil passage (4) which are opening at the front end surface of said collet so as to make cutting oil flow out towards the front end of said tool, said collet being formed with

   (a) a front end base portion (11), a main portion (10) and a rear end base portion (12) all together forming the substantial portion of said collet, said front end base portion (11) being formed with a groove (17) adapted to be connected to said clamp member (20) in said collet chuck (A),
   (b) a first set of axially long radial slits (14) opening at the end surface of said front end base portion (11) and terminating to be closed in said rear end base portion (12) and
   (c) a second set of axially long radial slits (15) opening at the end surface of said rear end base portion (12) and terminating to be closed in said front end base portion (11),

   each of the radial slits (14) of said first set and each of the radial slits (15) of said second set being arranged at proper angular intervals and alternatively along the peripheral direction of said collet, respective zigzag paths (16) being formed which are closed over the whole peripheries of the outside and inside surfaces of said collet, respectively, said outside and inside surfaces of said collet (9) contacting closely the inside peripheral surface of said tapered hole (2) and the outside peripheral surface of said tool, respectively, along said respective zigzag paths (16), said collet (9) being able to

contract radially owing to the slits of said two sets and said cutting oil supplied to said oil passage being adapted to flow out of said collet (9) through said jets (19) alone towards a tip of said tool, said second set of axially long radial slits (15) terminating at a position such that they do not extend into the groove (17), to be closed in said front end base portion.

2. An oil feeding collet chuck as set forth in claim 1, wherein said jets (19) communicate with said oil passage (4) through the slits (15) of said second set formed in said front end base portion.

3. An oil feeding collet chuck as set forth in claim 1, wherein a first slit group (14a) including one or more of the radial slits of said first set and a second slit group (15a) including one or more of the radial slits of said second set are arranged alternatively and similar zigzag paths are formed on said outside and inside surfaces of said collet.

4. An oil feeding collet chuck as set forth in claim 1, 2 or 3, wherein an oil duct (32) opening at the front end of said tool and communicating with said oil passage is formed along the axis of said tool and said oil duct is adapted to function as said jets (19).

5. An oil feeding collet chuck as set forth in anyone of the preceding claims, wherein said engage portion (17, 18) in said front end base portion (11) includes a fitting flange (18) formed integrally on the outside surface of said front end base portion (11) and said groove (17) contiguous to said fitting flange (18), said clamp member (20) including a cylindrical main body (21) in mesh with said main body (1) in said chuck and an engage member (22) adapted to be rotatable relative to said cylindrical main body but to move axially together with said cylindrical main body and said fitting flange (18) is adapted to be put into a fitting groove formed in said engage member.

6. An oil feeding collet chuck as set forth in claim 4, wherein said oil duct includes branching open ends (19b).

7. An oil feeding collet comprising a front end base portion (11) provided with an engage portion (17, 18) adapted to be connected to a clamp member (20) in a collet chuck, a main portion (10), a rear end base portion (12), said two base portions (11, 12) and said main portion (10) forming all together a substantial portion in said collet provided with a tapered outside surface closely adaptable in a tapered hole (2) in said collet chuck, a tool holding hole (13) formed in the axial portion of said collet, a first set of axially long radial slits (14, 14a) opening at the end surface of said front end base portion (11) and terminating to be closed in said rear end base portion (12) and a second set of axially long radial slits (15, 15a) opening at the end surface of said rear end base portion and terminating to be closed in said front end base portion (11), each of the radial slits (14, 14a) of said first set and each of the radial slits (15, 15a) of said second set being arranged at proper angular intervals and alternatively along the peripheral direction of the collet, respective zigzag paths (16, 16a) being formed which are closed over the whole peripheries of the outside and inside surfaces of said collet, respectively, said collet being able to contract radially owing to the radial slits of said two sets and said cutting oil being prevented from flowing along the outside and inside surfaces of said collet, said front end base portion (11) being formed with a groove (17) adapted to be connected to said clamp member (20) in said collet chuck (A), and said second set of axially long radial slits (15) terminating at a position such that they do not extend into the groove (17).

8. An oil feeding collet as set forth in claim 7, wherein jets (19) opening at the end surface of said front end base portion (11) are formed in said front end base portion and communicate with the slits (15, 15a) of said second set.

9. An oil feeding collet as set forth in claim 7 or 8, wherein said engage portion includes a fitting flange (18) formed integrally on the outside surface of said front end base portion (11) and said groove (17) contiguous to said fitting flange (18).

10. An oil feeding collet as set forth in claim 7, 8 or 9, wherein a first slit group including one or more of the radial slits of said first set and a second slit group including one or more of the radial slits of said second set are arranged alternatively and similar zigzag paths are formed on said outside and inside surface of said collet.

Patentansprüche

1. Spannzange (A) mit Ölspeisung, mit einem Hauptkörper (1), der ein sich verjüngendes Loch (2), das in dem vorderen Endabschnitt (1h) des Hauptkörpers ausgebildet ist, und einen Ölkanal (4) aufweist, der mit dem sich verjüngenden Loch (2) in Verbindung steht, einem Spannzangeneinsatz (9), der eine sich verjüngende Außenfläche aufweist, die eng in das sich verjüngende Loch (2) einpaßbar ist, einem Werkzeughalteloch (13), das in dem axialen Abschnitt des Spannzangeneinsatzes und in einem Eingriffsabschnitt (17, 18) ausgebildet ist, einem Klemmelement (20), das zum Eindrücken des Spannzangeneinsatzes (9) in das sich verjüngende Loch dient, wobei der Eingriffsabschnitt (17,

18) zur Verbindung mit dem Klemmelement (20) ausgelegt ist, einem Werkzeug (28), das in das Werkzeughalteloch (13) eingepaßt ist, und Düsenkanälen (19), die mit dem Ölkanal (4) in Verbindung stehen und sich an der vorderen Endfläche des Spannzangeneinsatzes öffnen, um hierdurch Schneidöl nach außen in Richtung zu dem vorderen Ende des Werkzeugs fließen zu lassen, wobei der Spannzangeneinsatz mit

(a) einem frontseitigen Basisabschnitt (11), einem Hauptabschnitt (10) und einem rückseitigen Basisabschnitt (12), die gemeinsam den hauptsächlichen Teil des Spannzangeneinsatzes bilden, wobei der frontseitige Basisabschnitt (11) mit einer Rille (17) versehen ist, die für die Verbindung mit dem Klemmelement (20) in der Spannzange (A) ausgelegt ist,
(b) einem ersten Satz von axial langgestreckten radialen Schlitzen (14), die sich an der Endfläche des frontseitigen Basisabschnitts (11) öffnen und in dem rückseitigen Basisabschnitt (12) enden und dort geschlossen sind, und
(c) einem zweiten Satz von axial langgestreckten radialen Schlitzen (15) versehen ist, die sich an der Endfläche des rückseitigen Basisabschnitts (12) öffnen und in dem frontseitigen Basisabschnitt (11) enden und dort geschlossen sind,

wobei jeder der radialen Schlitze (14) des ersten Satzes und jeder radiale Schlitz (15) des zweiten Satzes in geeigneten winkelmäßigen Abständen und alternierend entlang der Umfangsrichtung des Spannzangeneinsatzes angeordnet sind, wobei jeweilige zickzackförmige Pfade (16) gebildet sind, die über den gesamten Umfang der Außenflächen und Innenflächen des Spannzangeneinsatzes jeweils geschlossen sind, wobei die Außen- und Innenflächen des Spannzangeneinsatzes (9) in enger Berührung mit der inneren Umfangsfläche des sich verjüngenden Lochs (2) bzw. mit der äußeren Umfangsfläche des Werkzeugs entlang der jeweiligen zickzackförmigen Pfade (16) stehen, wobei der Spannzangeneinsatz (9) sich in radialer Richtung aufgrund der Schlitze der beiden Sätze zusammenziehen kann und das Schneidöl, das zu dem Ölkanal geführt ist, aus dem Spannzangeneinsatz (9) ausschließlich durch die Düsenkanäle (9) in Richtung zu der Werkzeugspitze herausfließen kann, wobei der zweite Satz von axial langgestreckten radialen Schlitzen (15) an einer solchen Position endet, daß sich diese nicht in die Rille (17) hineinerstrecken und in dem frontseitigen Basisabschnitt geschlossen sind.

2. Spannzange nach Anspruch 1, bei der die Düsenkanäle (19) mit dem Ölkanal (4) über die Schlitze (15) des zweiten Satzes, der in dem frontseitigen Basisabschnitt gebildet ist, in Verbindung stehen.

3. Spannzange nach Anspruch 1, bei der eine erste Schlitzgruppe (14a), die einen oder mehrere der radialen Schlitze des ersten Satzes enthält, und eine zweite Schlitzgruppe (15a), die einen oder mehrere der radialen Schlitze des zweiten Satzes enthält, abwechselnd angeordnet sind und gleichartige, zickzackförmige Pfade an der Außenfläche und der Innenfläche des Spannzangeneinsatzes gebildet sind.

4. Spannzange nach Anspruch 1, 2 oder 3, bei der eine Ölführung (32), die sich an dem vorderen Ende des Werkzeugs öffnet und mit dem Ölkanal in Verbindung steht, entlang der Achse des Werkzeugs gebildet ist, wobei die Ölführung dazu ausgelegt ist, als die Düsenkanäle (19) zu fungieren.

5. Spannzange nach einem der vorhergehenden Ansprüche, bei der der Eingriffsabschnitt (17, 18) in dem frontseitigen Basisabschnitt (11) einen Paßflansch (18) enthält, der einstückig an der äußeren Fläche des frontseitigen Basisabschnitts (11) ausgebildet ist, und die Rille (17) an den Paßflansch (18) angrenzt, wobei das Klemmelement (20) einen zylindrischen Hauptkörper (21), der mit dem Hauptkörper (1) in der Spannzange in Eingriff steht, und ein Eingriffselement (22) aufweist, das derart ausgebildet ist, daß es relativ zu dem zylindrischen Hauptkörper drehbar ist und sich zusammen mit dem zylindrischen Hauptkörper axial bewegt, wobei der Paßflansch (18) derart ausgelegt ist, daß er in eine Paßrille, die in dem Eingriffselement ausgebildet ist, einbringbar ist.

6. Spannzange nach Anspruch 4, bei der die Ölführung sich verzweigende offene Enden (19b) enthält.

7. Spannzangeneinsatz mit Ölspeisung, mit einem frontseitigen Basisabschnitt (11), der mit einem Eingriffsabschnitt (17, 18) versehen ist, der zur Verbindung mit einem Klemmelement (20) in einer Spannzange ausgelegt ist, einem Hauptabschnitt (10), einem rückseitigen Basisabschnitt (12), wobei die beiden Basisabschnitte (11, 12) und der Hauptabschnitt (10) gemeinsam einen wesentlichen Abschnitt in dem Spannzangeneinsatz bilden, der mit einer kegelförmig verlaufenden Außenfläche versehen ist, die in ein kegelförmiges Loch (2) in der Spannzange mit enger Berührung einbringbar ist, einem Werkzeughalteloch (13), das in dem axialen Abschnitt des Spannzangeneinsatzes ausgebildet ist, einem ersten Satz von axial langgestreckten radialen Schlitzen (14, 14a), die sich an der Endfläche des frontseitigen Basisabschnitts (11) öffnen und in dem rückseitigen Basisabschnitt (12) enden und dort geschlossen sind, und einem zweiten Satz von axial langgestreckten radialen

Schlitzen (15, 15a), die sich an der Endfläche des rückseitigen Basisabschnitts öffnen und in dem frontseitigen Basisabschnitt (11) enden und dort geschlossen sind, wobei jeder der radialen Schlitze (14, 14a) des ersten Satzes und jeder der radialen Schlitze (15, 15a) des zweiten Satzes in geeigneten winkelmäßigen Abständen und alternierend entlang der Umfangsrichtung des Spannzangeneinsatzes angeordnet sind, wobei jeweilige, zickzackförmige Pfade (16, 16a) gebildet sind, die über die gesamte Peripherie der Außenfläche und Innenfläche des Spannzangeneinsatzes jeweils geschlossen sind, wobei sich der Spannzangeneinsatz sich aufgrund der radialen Schlitze der beiden Sätze in radialer Richtung zusammenziehen kann und das Schneidöl daran gehindert wird, entlang der Außenfläche und Innenfläche des Spannzangeneinsatzes zu fließen, wobei der frontseitige Basisabschnitt (11) mit einer Rille (17) versehen ist, die zur Verbindung mit dem Klemmelement (20) in der Spannzange (A) ausgelegt ist, wobei der zweite Satz von axial langgestreckten Schlitzen (15) an einer solchen Position endet, daß sich diese nicht in die Rille (17) hineinerstrecken.

8. Spannzangeneinsatz nach Anspruch 7, bei dem Düsenkanäle (19), die sich an der Endfläche des frontseitigen Basisabschnitts (11) öffnen, in dem frontseitigen Basisabschnitt ausgebildet sind und mit den Schlitzen (15, 15a) des zweiten Satzes in Verbindung stehen.

9. Spannzangeneinsatz nach Anspruch 7 oder 8, bei dem der Eingriffsabschnitt einen Paßflansch (18), der einstückig an der Außenfläche des frontseitigen Basisabschnitts (11) ausgebildet ist und die Rille (17) an den Paßflansch (18) angrenzt.

10. Spannzangeneinsatz nach Anspruch 7, 8 oder 9, bei dem eine erste Schlitzgruppe, die einen oder mehrere der radialen Schlitze des ersten Satzes enthält, und eine zweite Schlitzgruppe, die einen oder mehrere der radialen Schlitze des zweiten Satzes enthält, abwechselnd angeordnet sind und gleichartige, zickzackförmige Pfade an der Außenfläche und der Innenfläche des Spannzangeneinsatzes gebildet sind.

Revendications

1. Mandrin à pince à circulation d'huile (A) comprenant un corps principal (1) comportent un trou conique (2) formé dans la partie d'extrémité avant (1h) de celui-ci et un passage d'huile (4) communiquant avec ledit trou conique (2), une pince 9 comportant une surface conique extérieure étroitement adaptable audit trou conique (2), un trou de porte-outil (13) formé dans la partie axiale de celui-ci et une partie coopérante (17,18), un élément de serrage (20) pour pousser ladite pince(9) dans ledit trou conique, ladite partie coopérante (17, 18) étant conçue pour être reliée audit élément de serrage (20), un outil (28) monté dans ledit trou de porte-outil (13) et des gicleurs (19) communiquant avec ledit passage d'huile (4), lesquels s'ouvrent au niveau de la surface d'extrémité avant de ladite pince de manière à faire en sorte que l'huile de coupe sorte vers l'extrémité avant dudit outil, ladite pince étant formée avec

a) une partie de base d'extrémité avant (11) une partie principale (10) et une partie de base d'extrémité arrière (12) formant ensemble la partie réelle de ladite pince, ladite partie de base d'extrémité avant (11) étant formée avec une rainure (17) adaptée pour être reliée audit élément de serrage (20) dans ledit mandrin à pince (A),
b) une première série de fentes radiales allongées axialement (14) s'ouvrant au niveau de la surface d'extrémité de ladite partie de base d'extrémité avant (11) et se terminant pour être fermée dans ladite partie de base d'extrémité arrière (12) et
c) une seconde série de fentes radiales allongées axialement (15) s'ouvrant au niveau de la surface d'extrémité de ladite partie de base d'extrémité arrière (12) et se terminant pour être fermée dans ladite partie de base d'extrémité avant (11),

chacune des fentes radiales (14) de ladite première série et chacune des fentes radiales (15) de ladite seconde série étant disposée à des intervalles angulaires appropriés et de façon alternée le long de la direction périphérique de ladite pince , des parcours correspondants en zigzag (16) étant formés, lesquels sont fermés respectivement sur les périphéries complètes des surfaces extérieure et intérieure, lesdites surfaces extérieure et intérieure de ladite pince (9) étant en contact étroit respectivement avec la surface périphérique intérieure dudit trou conique (2) et avec la surface périphérique extérieure dudit outil, le long desdits parcours correspondants en zigzag (16), ladite pince (9) étant capable de rétrécir radialement en raison des fentes des deux séries et ladite huile de coupe amenée jusqu'audit passage d'huile étant adaptée pour sortir de ladite pince (9) par seulement lesdits gicleurs (19) pour aller vers le bout dudit outil, ladite seconde série de fentes radiales allongées axialement (15) se terminant à une position telle qu'elles ne s'étendent pas dans la rainure (17), pour être fermées dans ladite partie de base d'extrémité avant.

2. Mandrin à pince à circulation d'huile selon la revendication 1, dans lequel lesdits gicleurs (19) commu-

niquent avec ledit passage d'huile (4) par l'intermédiaire des fentes (15) de ladite seconde série formées dans ladite partie de base d'extrémité avant.

3. Mandrin à pince à circulation d'huile selon la revendication 1, dans lequel un premier groupe de fentes (14a) incorporant une ou plusieurs des fentes radiales de ladite première série et un second groupe de fentes (15a) incorporant une ou plusieurs des fentes radiales de ladite seconde série sont disposées de façon alternée et dans lequel des parcours identiques en zigzag sont formés sur lesdites surfaces extérieure et intérieure de ladite pince.

4. Mandrin à pince à circuit d'huile selon la revendication 1, 2 ou 3, dans lequel un conduit d'huile (32) s'ouvrant au niveau de l'extrémité avant dudit outil et communiquant avec ledit passage d'huile est formé le long de l'axe dudit outil et dans lequel ledit conduit d'huile est adapté pour fonctionner comme lesdits gicleurs (19).

5. Mandrin à pince à circulation d'huile selon l'une quelconque des revendications précédentes, dans lequel ladite partie coopérante (17,18) de ladite partie de base d'extrémité avant (11) comprend une bride de montage (18) formée d'un seul tenant sur la surface extérieure de ladite partie de base d'extrémité avant (11) et de ladite rainure (17) adjacente à ladite bride de montage (18), ledit élément de serrage (20) incorporant un corps principal cylindrique (21) en prise avec ledit corps principal (1) dudit mandrin et avec l'élément coopérant (22) adapté pour pouvoir tourner par rapport audit corps principal cylindrique mais pour se déplacer axialement en même temps que ledit corps cylindrique principal et dans lequel la bride de montage (18) est adaptée pour être installée dans une rainure de montage formée dans ledit élément coopérant.

6. Mandrin à pince à circulation d'huile selon la revendication 4, dans lequel ledit conduit d'huile incorpore des extrémités ouvertes ramifiées (19b).

7. Pince à circulation d'huile comprenant une partie de base d'extrémité avant (11) pourvue d'une partie coopérante (17, 18) adaptée pour être reliée à l'élément de serrage (20) d'un mandrin à pince, une partie principale (10), une partie de base d'extrémité arrière (12), lesdites deux parties de base (11,12) et ladite partie principale (10) formant ensemble la partie réelle de ladite pince pourvue d'une surface conique extérieure étroitement adaptable à un trou conique (2) dudit mandrin à pince, un trou de porte-outil (13) formé dans la partie axiale de ladite pince, une première série de fentes radiales allongées axialement (14, 14a) s'ouvrant au niveau de la surface d'extrémité de ladite partie de base d'extrémité avant (11) et se terminant pour être fermée dans ladite partie de base d'extrémité arrière (12) et une seconde série de fentes radiales allongées axialement (15, 15a) s'ouvrant au niveau de la surface d'extrémité de ladite partie de base d'extrémité arrière et se terminant pour être fermée dans ladite partie de base d'extrémité avant (11), chacune des fentes radiales (14, 14a) de ladite première série et chacune des fentes radiales (15, 15a) de ladite seconde série étant disposée à des intervalles angulaires appropriés et de façon alternée le long de la direction périphérique de la pince, des parcours correspondants en zigzag (16, 16a) étant formés, lesquels sont formés respectivement sur les périphéries complètes des surfaces intérieures et extérieures de ladite pince, ladite pince étant capable de se rétrécir radialement en raison des fentes radiales des deux séries et ladite huile de coupe étant empêché de circuler le long des surfaces extérieures et intérieures de ladite pince, ladite partie de base d'extrémité avant (11) étant formée avec une rainure (17) adaptée pour être reliée audit élément de serrage (20) dudit mandrin à pince (A), et ladite seconde série de fentes radiales allongées axialement (15) se terminant à une position telle qu'elles ne s'étendent pas dans la rainure (17).

8. Pince à circulation d'huile selon la revendication 7, dans laquelle les gicleurs (19) s'ouvrant au niveau de la surface d'extrémité de ladite partie de base d'extrémité avant (11) sont formées dans ladite partie de base d'extrémité avant et communiquent avec les fentes (15, 15a) de ladite seconde série.

9. Pince à circulation d'huile selon la revendication 7 ou 8, dans laquelle ladite partie coopérante comprend une bride de montage (18) formée d'un seul tenant sur la surface extérieure de ladite partie de base d'extrémité avant (11) et de ladite rainure (17) adjacente à ladite bride de montage (18).

10. Pince à circulation d'huile selon la revendication 7, 8 ou 9, dans laquelle un premier groupe de fentes incorporant une ou plusieurs des fentes radiales de ladite première série et un seconde groupe de fentes incorporant une ou plusieurs des fentes radiales de ladite seconde série sont disposées de façon alternée et dans laquelle des parcours en zigzag identiques sont formés sur lesdites surfaces extérieure et intérieure de ladite pince.

FIG. 1

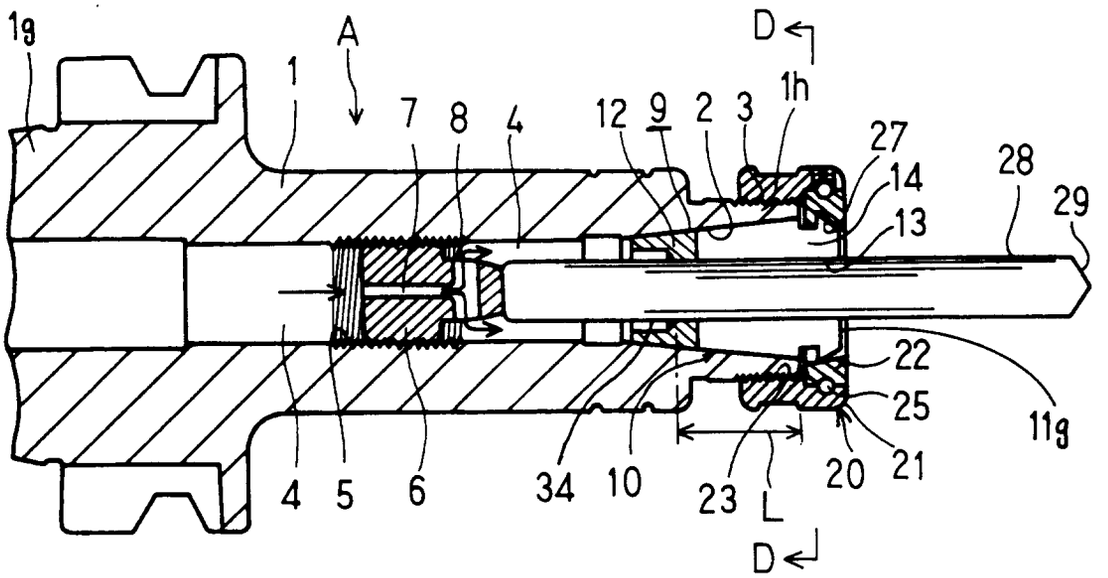

1g
A
1
7
8
4
12
9
2
3
1h
27
14
13
28
29
22
25
11g
4
5
6
34
10
23
L
20
21
D
D

FIG. 2

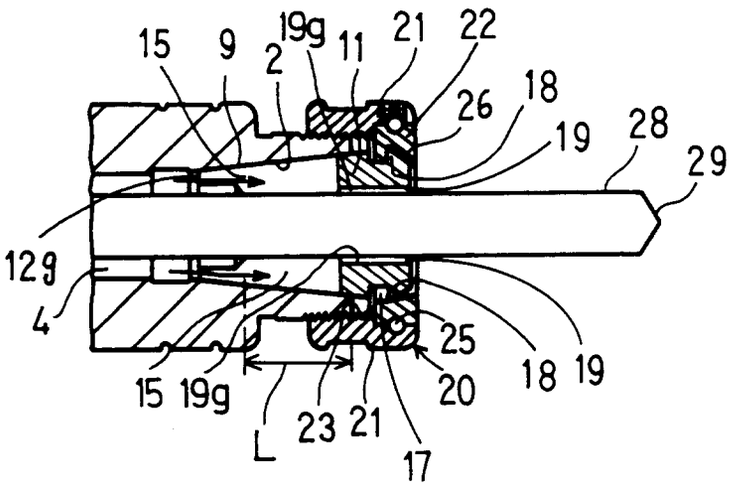

15
9
2
19g
11
21
22
26
18
19
28
29
12g
4
25
18
19
15
19g
23
21
20
L
17

FIG .3A

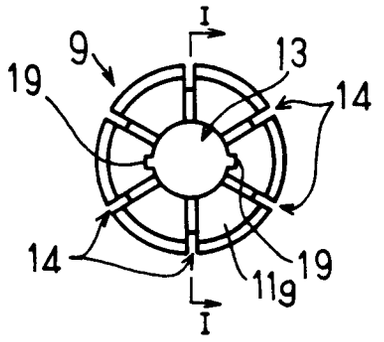


FIG .3B

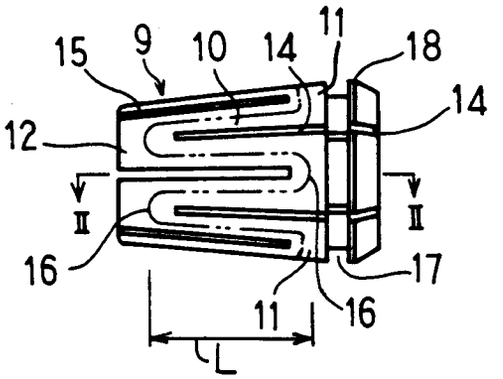


FIG .3C

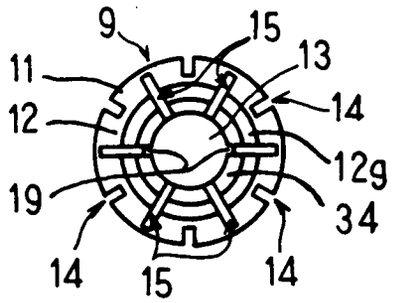


FIG .3D

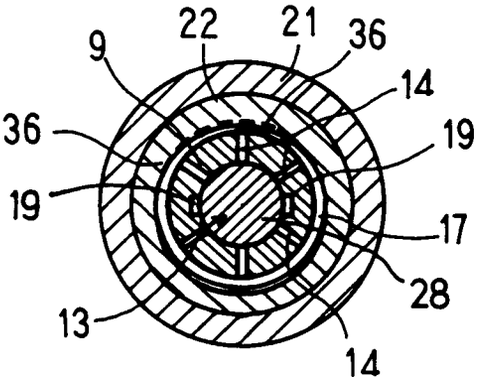


FIG.4A

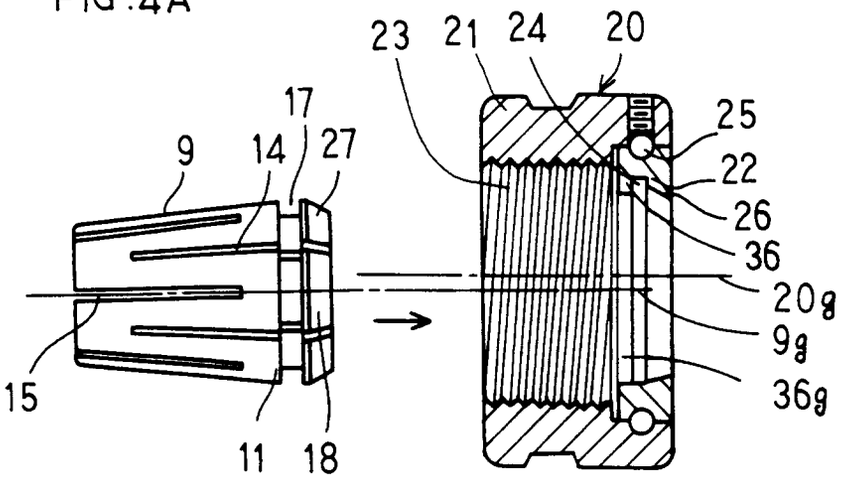


FIG.4B

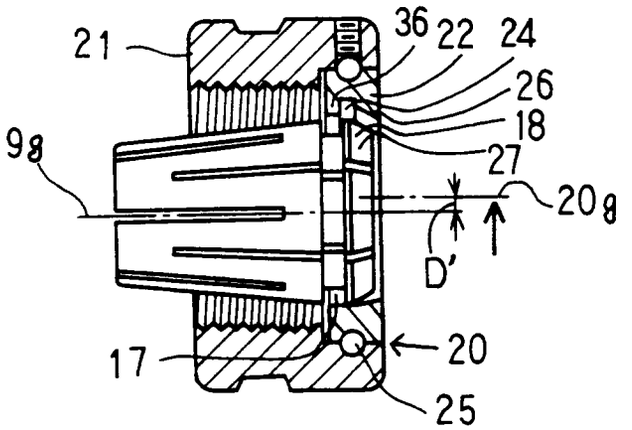


FIG.4C

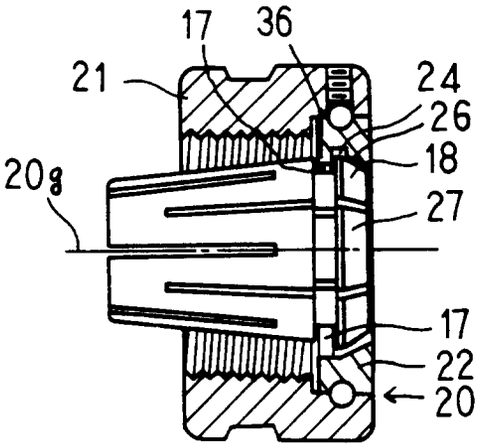


FIG.5

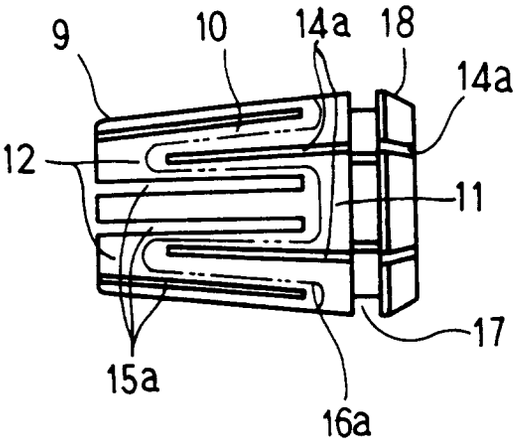

9
10
14a
18
14a
12
11
17
15a
16a

FIG.6

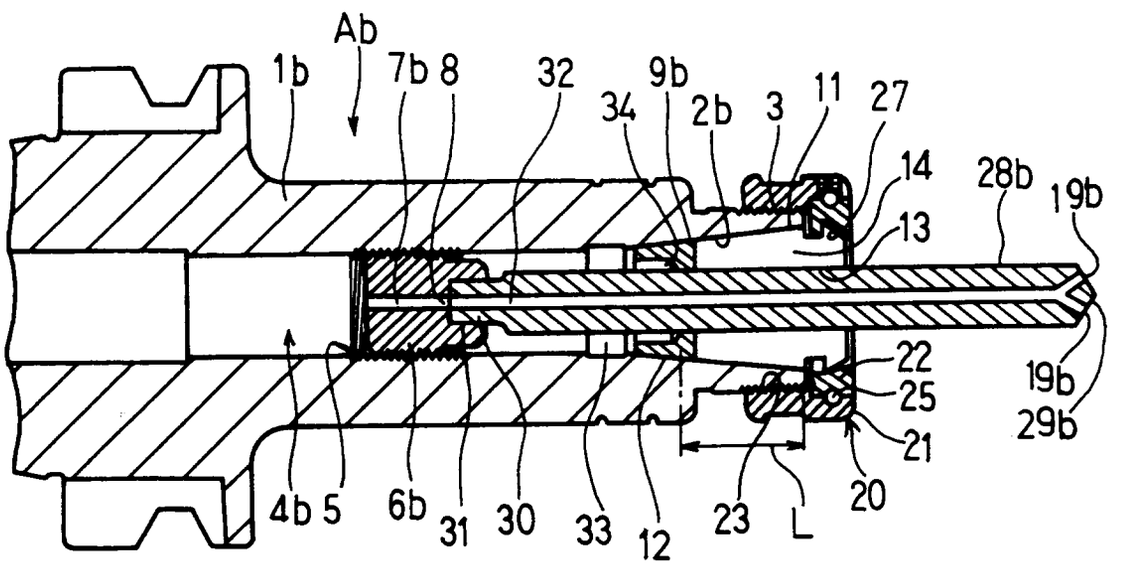

Ab
1b
7b
8
32
9b
34
2b
3
11
27
14
28b
19b
13
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21
19b
29b
20
4b
5
6b
31
30
33
12
23
L

FIG.7

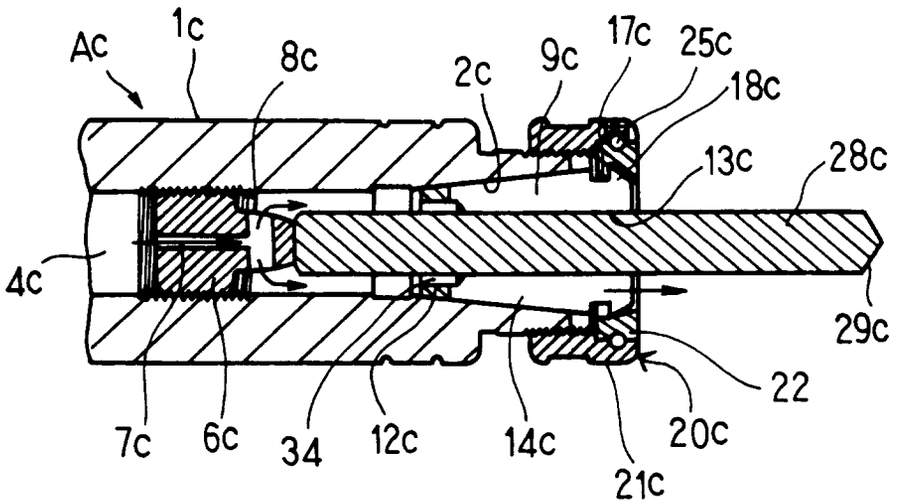
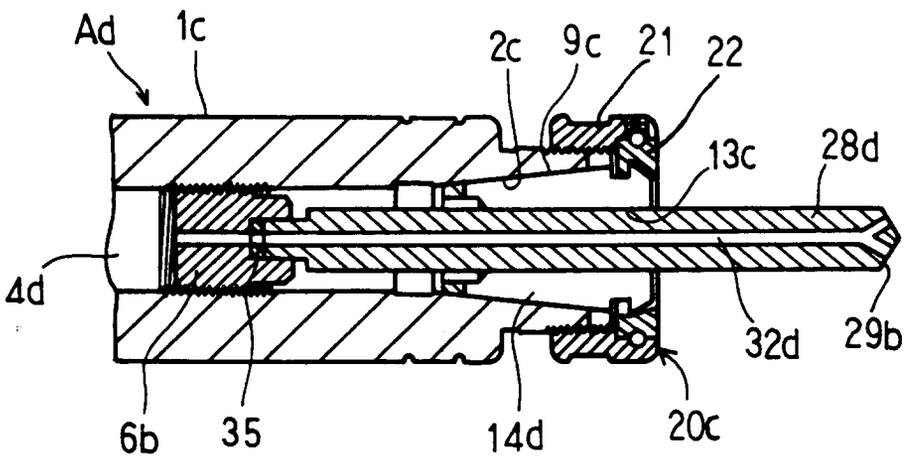

Ac
1c
8c
2c
9c
17c
25c
18c
13c
28c
4c
29c
22
7c
6c
34
12c
14c
20c
21c

FIG.8


Ad
1c
2c
9c
21
22
13c
28d
4d
32d
29b
6b
35
14d
20c